

Conference Frontiers of Quantum and Mesoscopic Thermodynamics 2011

Public Lecture of Claude Cohen-Tannoudji with the Concert

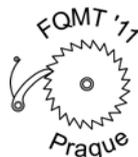
Dvořák's Hall of Rudolfinum
Thursday July 28, 2011

18:30 – 18:45	Music introduction Opening address by Roger Balian
18:45 – 19:45	Claude Cohen-Tannoudji Laser Manipulation of Atoms
19:45 – 20:00	Discussion
20:00 – 20:20	Break
20:20 – 21:40	Concert

Music introduction

L. Boëllmann (1862-1897)
J. Kšica (organ)

Toccata from Gothic Suite



<http://conferences.fzu.cz/fqmt/11/>



“Laser Manipulation of Atoms”

Claude Cohen-Tannoudji

École Normale Supérieure, Paris

Understanding the nature of light and its interactions with matter has always been a challenge for Physics. New concepts have emerged from these investigations, such as the quantum nature of the microscopic world and the wave-particle duality. New mechanisms for the generation of light have also been discovered, leading to the realization of new light sources, called “lasers”, with remarkable properties. The light emitted or absorbed by atoms is not only a valuable source of information on the structure of the world which surrounds us. It is also a powerful tool for acting on atoms, for manipulating them, for controlling their various degrees of freedom.

It will be shown how it is possible to use laser light for cooling atoms to very low temperatures, in the microkelvin, and even in the nanokelvin range. A few cooling mechanisms will be described. A review will be also given of recent developments in this field. A first one concerns ultra-precise atomic clocks using cold atoms, with errors less than one second in one billion years. These atomic clocks will allow one to perform more refined tests of fundamental theories, like general relativity, and to improve the global positioning system (GPS). Another spectacular application of ultracold atoms is the realization of new states of matter such as Bose-Einstein condensates, where a macroscopic number of bosonic atoms occupy the same wave function giving rise to a macroscopic matter wave. New perspectives opened by these results will be briefly discussed.

Claude Cohen-Tannoudji

Claude Cohen-Tannoudji (born April 1, 1933) is a French theoretical physicist and Nobel Laureate. He shared the 1997 Nobel Prize in Physics with Steven Chu and William Daniel Phillips for research in methods of laser cooling and trapping atoms. He works at the Laboratoire Kastler-Brossel of the École Normale Supérieure in Paris.

Claude Cohen-Tannoudji was born in Constantine. After graduating from the University of Constantine (Algeria), he left Algeria for Paris to attend the École Normale Supérieure. His professors included Henri Cartan, Laurent Schwartz, and Alfred Kastler.

After his dissertation, he started teaching quantum mechanics at the University of Paris. His lecture notes were the basis of the popular textbook, *Mécanique quantique*, which he wrote with Bernard Diu and Franck Laloë. He also continued his research work on atom-photon interactions, and his research team developed the model of the dressed atom.

In 1973, he became a professor at the Collège de France. In the early 1980s, he started to lecture on radiative forces on atoms in laser light fields. He also formed a laboratory there with Alain Aspect, Christophe Salomon, and Jean Dalibard to study laser cooling and trapping. His work there eventually led to the Nobel Prize.

Program of the Concert

G.F. Handel (1685-1759) Z. Šedivý, F. Svejkský (trumpets) J. Kšica (organ)	Suite in D major for two trumpets and organ Overture, Allegro, Air, Bourrée, March
H.I.F. Biber (1644-1704) Y. Waldman (violin)	Passacaglia from Mystery Sonatas (Rosary Sonatas)
M. Duruflé (1902-1986) P. Kšica (organ)	Prélude et Fugue sur le nom d'Alain, Op. 7
J.Ch. Pepusch (1667-1752) Z. Šedivý (trumpet) J. Kšica (organ)	Concert D Major for Trumpet and Organ Largo, Allegro, Grave, Menuet, Marche
Y. Waldman Y. Waldman (violin)	Jerusalem of Gold, Fantasy for Violin
J. Suk (1874-1935) Y. Waldman (violin) T. Víšek (piano)	Four pieces, op. 17 2. Appassionato 4. Burlesque
J. Ježek (1906-1942) T. Víšek (piano)	Spring wind Three policemen Bugatti step
J. Kšica (organ)	Organ Improvisations

Performers

Yuval Waldman (violin)

Violinist and conductor Yuval Waldman has been described as “brilliant” (Musical America) and “spectacular” (The New York Times). Born in Russia, Waldman played his first public performance at the age of 8. He studied violin with Isaac Stern, Ivan Galamian, Joseph Gingold, Rene Benedetti, Lorand Fenyves and took part in Master classes with Joseph Szigeti, Nathan Millstein, Henryk Szeryng, Zino Francescatti. Raphael Kubelik, Jorge Mester, Leonard Bernstein, William Vaccano were his teachers of conducting.

Yuval Waldman made his New York debut on the International Series at Carnegie Hall, Jeunesse Musicales. He is a versatile performer who has earned acclaim both for his playing of the standard repertory and for his thoughtful and stylish interpretations of Baroque music. He has also championed rarely performed nineteenth century masterpieces and commissioned or premiered works by contemporary American and Israeli composers. Yuval Waldman has appeared as a violin soloist with dozens of prominent orchestras in the United States, Canada, Europe and Israel and given recitals at Carnegie Hall, Lincoln Center, The Kennedy Center, Wigmore Hall in London and Concertgebouw in Amsterdam.

He has performed with such artists as Isaac Stern, Pinchas Zuckerman, Jean-Pierre Rampal, Maureen Forrester and Henrik Szering. He is the first violinist in the acclaimed Kinor String Quartet and a winner of the America-Israel Cultural Foundation Prize and the Distinguished First Prize at the Conservatory of Geneva. He has recorded on the Angel, Newport Classics, Omega Classical, CRI, Musique International and Musical Heritage Society labels.

His career as a conductor includes performances and recordings with several of the orchestras listed above, as well as the New American Chamber Orchestra, the Midatlantic Chamber Orchestra; the Philadelphia Chamber Orchestra and the Cologne Opera. He celebrated the fiftieth anniversary of the founding of Israel in Moscow and conducted the memorial concert on the steps of Congress on September 11, 2002. He was the founding music director of the Madeira Bach Festival, the Jefferson Music Festival in Washington D.C., the Opus Berkshire Festival in Massachusetts and the Benedictine Millennium Festival in Rome.

He has served as director of the World Bank Mozart Festival and the Midatlantic Chamber Orchestra. In 2005, Maestro Waldman founded Music Bridges International, Inc., (www.musicbridgesinternational.com), to foster cross-cultural music exchange programs that feature the music of different countries.

Josef Kšica (organ)

Studied organ at the Conservatory in Brno and at the Academy of Performing Arts in Prague in the class of Professors Milan Šlechta and Jiřina Pokorná. In addition, he studied composition with Professor Jan Duchoň. After many years of practicing as an organist and a singer of Czech leading choirs (Prague Philharmonic Choir, Prague Chamber Choir) Mr. Kšica became the choirmaster in St. Vitus Cathedral in Prague. Beside these activities, he performs old Czech as well as world sacred music, occasionally in new premieres. He also cooperated with the specialist on Bach music, Professor H. Rilling. As an organist Mr. Kšica has been performing at concerts in his country and abroad. He has also been increasingly seen on the stage as a conductor. Aside from his interpretation achievements, Josef Kšica is a well-known scholar and editor for many European archives. *Ars Instrumentalis Pragensis*, in particular, is grateful to him for his continued broadening of their repertoire.

Přemysl Kšica (organ)

Graduated from the Prague conservatory (organ, the class of Professor Popelka). He continued his studies of organ at the Academy of Music Arts in Prague and Staatliche Hochschule für Musik und Darstellende Kunst in Stuttgart with Professor Ludger Lohmann. He studied also organ improvisation with Professors Jaroslav Vodrážka, Jaroslav Tůma a Johannes Mayr. Přemysl Kšica won numerous prizes in Czech and international organ competitions. He is playing regularly in Prague churches, especially in the Church of Our Lady of the Snow. He has been performing at many concerts in his country and abroad.

Zdeněk Šedivý (trumpet)

Was born in Prague in the family with musical tradition. At the age of 14 he started to study at Prague Conservatory in the class of Professor J. Svejkský. Since 1978 he continued his studies at the Academy of Musical Arts in Prague under Professor V. Junek. He graduated in 1983. During his studies he participated in many competitions. In 1971 he received second prize at the International competition of the Concertino Praga 1971. Four years later he won first prize at the International competition of the Concertino Praga 1975. In 1978 he was named the absolute winner of the International competition Prague Spring. 1978. Since 1985 he has been the first trumpeter with the Czech Philharmonic Orchestra. He has also performed as soloist in many countries of Europe as well as Japan, USA, Australia, Hong Kong, Norway, Austria, Germany, Luxembourg and Russia. Accomplishments to date are also four solo records and number of recordings for radio. In addition to his successful career he currently works as a pedagogue. He started to teach at Prague Conservatory in 2000. Since 2008 he has been a professor at the Academy of Musical Arts.

František Svejkovský (trumpet)

Studied at the Prague Conservatory. In 1983 he took part in Czech Conservatories Competition, where he obtained 2nd place in trumpet play. In the same competition held in 1985, he won the 1st place in trumpet play at a higher category. Since 1982 he has performed with a number of chamber ensembles, in dance and theatre orchestras. Since 1994 he has been a member of the Fanfare Orchestra of the Prague Castle Guard. He is a solo trumpeter, head of the Orchestra, and deputy commander of the Prague Castle Music Ensemble.

Tomáš Víšek (piano)

He developed a career as a solo pianist after graduating from the Prague Conservatory (professors V. Kameníková and Z. Kožina), and from the Academy of Music Arts in the class of J. Páleníček and Z. Jílek, He has established his reputation performing both famous and lesser known repertoire, some of which being undeservedly neglected. He has toured throughout the world including Austria, Holland, Switzerland, France, Italy, Japan, and has made several recordings for radio and television and on CDs. Tomáš Víšek won numerous prizes in international competitions. His solo recital in the Prague Spring Festival in 1997 and the further performances there in 2002 and 2003 were met with high acclaim, as were his interpretation of Gershwin's Rhapsody in Blue in the sold out Rudolfinum concert hall in Prague.

